Enclosure 2
Test Procedures, Methods, and Reporting Requirements for Coke Oven Facilities

Contents

COKE OVENS SECTION 114 REQUEST–ENCLOSURE 2
Risk and Technology Review:
40 CFR part 63, subpart CCCCC and subpart L

Introduction

This document explains the required testing, approved sampling and analysis methods, target pollutant units of measure, and reporting requirements for coke oven facilities who are required to provide emission test data under EPA's authority under the Clean Air Act (CAA) section 114 (42 U.S.C. 7414). See **Enclosure 3** of this test request for details about this authority. The purpose for this testing is to gather data on air pollutant emissions from coke oven facilities in this source category to inform the EPA's risk and technology review (RTR) for these sources.

The following is the schedule for submitting responses to both **Enclosure 1** and **Enclosure 2**, and submittal of other relevant information. Although only a subset of the coke oven facilities will be performing new testing requested and described here in **Enclosure 2**, all operating by-product (ByP) facilities and selected heat and nonrecovery (HNR) facilities will receive the accompanying section 114 information collection request letter and must complete the questionnaire in **Enclosure 1**.

Schedule for Submissions – Enclosures 1 and 2[a,b]

Item[a]	Submit by Date[b]	Days[b]
Submit detailed explanation of stack testing problems (**Enclosure 2**)	35 days	35
Fugitive (monitoring plan, test plan, & QAPP) (**Enclosure 2**)	45 days	45
Submit schedule(s) for stack testing (**Enclosure 2**)	12 weeks	85
Begin fugitive monitoring (**Enclosure 2**)	Within 40 days of the date EPA approves the monitoring plan	
Submit **Enclosure 1** responses	9 weeks plus two days	65
Notify your state of upcoming stack tests (copy to Dr. Jones)	21 days before testing	--
First 3 months of fugitive monitoring data (**Enclosure 2**)	Within 140 days of the date EPA approves the monitoring plan	--
Submit stack test reports & data spreadsheets (**Enclosure 2**)	22 weeks	154
Second 3 months of fugitive monitoring data	Within 230 days of the date EPA approves the monitoring plan	--

[a] All submissions should be done electronically or on electronic media (file, CD, DVD, or flash drive/USB) by: (1) email non-confidential files (< 10MB) to the ***Coke 2022 section 114 email*** address maintained by RTI (Coke.ICR2@rti.org). If assistance is needed with submitting large electronic files that exceed the file size limit for email attachments, please email Coke.ICR2@rti.org to request a file transfer link or (2) mail non-confidential files on CD/DVDs or flash drive/USB via private courier or U.S. post office to Dr. Donna Lee Jones, at the U.S. EPA Office of Air Quality Planning and Standards in RTP, NC., at the addresses listed below in **Section 3** of this enclosure. See also detailed instructions in **Section 3** regarding instructions for submitting CBI.
[b] From date of EPA email with Coke Oven section 114 information request package.

If your facility has units that are required to be tested according to this enclosure but you are unable to respond to an item exactly as requested, please explain why you cannot respond and/or provide any information you believe may be related and send this explanation by email to **Dr. Donna Lee Jones** at Jones.DonnaLee@epa.gov within **35 days** of EPA email with the section 114 package. For example, if you have a special or unique type of emission process unit and the questions or testing requirements in the section related to that emission process unit are not relevant to your specific unit, please provide information that would help EPA understand and classify your emission process unit.

Note: EPA reserves all of its enforcement rights provided by the CAA section 113, including the right to bring a claim in the U.S. District Court to enforce the CAA section 114 obligation to comply with all the requests described in **Enclosure 1** and **Enclosure 2**.

1.0 Test Pollutants and Parameters, Methods, and Procedures

This section includes a summary of emission process units that require testing and the pollutants requested for each process, as well as detailed description of testing which includes among other items, required test locations, test methods, units of measure, and the minimum required number of test runs. Discussion is also included on tests that should be done concurrently.

The tables in this section show the various information required to be tested. The sources, pollutants and methods required are described in Tables 1.A and 1.B. All data and process information requested in **Tables 2** through **9** must be entered into the appropriate worksheets in the appropriate files: ***Coke-Enclosure-2-Emission Test Data Answer File.xlsx; Coke-Enclosure-2-Door-Leaks.xlsx***; and ***Enclosure-2_Coke 114_fugitive_monitoring.xlsx*** provided with this CAA section 114 request. The Excel® files contain individual blank worksheets to be used to enter the test data for emission tests that are not reported using the EPA's Electronic Reporting Tool (ERT) Version 6 and for fenceline/interior monitoring data.

This information collection request includes test data requests for particulate matter (PM) including filterable PM (PM filterable); hazardous air pollutants (HAP) that are metal compounds; hydrogen chloride (HCl), hydrogen fluoride (HF), and hydrogen cyanide (HCN); sulfur dioxide (SO_2); carbon monoxide (CO); carbon dioxide (CO_2), speciated volatile HAP (VOHAP) of benzene, toluene, ethylbenzene, xylene (BTEX), and also formaldehyde; semi-volatile HAP, such as polycyclic aromatic hydrocarbons (PAHs), including naphthalene and dioxin/furans; air flow rate/velocity and the related parameters of O_2/CO_2 and moisture; and opacity and/or visible emissions. The testing required of coke manufacturing facilities is intended to provide information regarding the pollutants, emissions, and emissions parameters, as discussed in this enclosure.

The following is a list of pollutants and parameters to be tested with their CAS Numbers (No.),[1] as available, and their acronyms, as applicable. **Appendix A** lists all of the HAP and their CAS No., as designated. (*Note*: Not all pollutants will have a CAS No., e.g., opacity). **Appendix A** also lists some common abbreviations and acronyms, and some unit conversions that may be useful.

Individual Air Pollutants/Parameters (and CAS No., where available)

Carbon dioxide (CO_2) (124-38-9)
Carbon disulfide (CS_2) (75-15-0)
Carbon monoxide (CO) (630-08-0)
Carbonyl sulfide (COS) (463-58-1)
Hydrogen chloride (HCl) (7647-01-0)
Hydrogen cyanide (HCN) (74-90-8)
Hydrogen fluoride (HF) (7664-39-3)
Hydrogen sulfide (H_2S) (7783-06-4)
Oxides of nitrogen (NO_x) (11104-93-1)

[1] CAS number databases are available on various websites. See http://www.commonchemistry.org/ as one example. See https://www.cas.org/content/chemical-substances/faqs for information about CAS numbers.

Opacity
Oxygen (O_2) (7782-44-7)
Particulate matter (PM), filterable
Sulfur dioxide (SO_2) (7446-09-5)
Visible emissions (VE, leaks)

HAP Metals (and CAS No.'s)

Antimony (7440-36-0)
Arsenic (7440-38-2)
Beryllium (7440-41-7)
Cadmium (7440-43-9)
Chromium, total (7440-47-3)
Cobalt (7440-48-4)
Lead (7439-92-1)
Manganese (7439-96-5)
Mercury (7439-97-6)
Nickel (7440-02-0)
Selenium (7782-49-2)

Semi-volatile HAP (Polycyclic Aromatic Hydrocarbons (PAH)) and CAS No. [2]

Acenaphthene (83-32-9)
Acenaphthylene (208-96-8)
Anthracene (120-12-7)
Benz[a]anthracene (56-55-3)
Benzo[a]pyrene (50-32-8)
Benzo[b]fluoranthene (205-99-2)
Benzo[g,h,i]perylene (191-24-2)
Benzo[k]fluoranthene (207-08-9)
Chrysene (218-01-9)
Dibenz[a,h]anthracene (53-70-3)
Fluoranthene (206-44-0)
Fluorene (86-73-7)
Indeno (1,2,3-cd) pyrene (193-39-5)
Naphthalene (91-20-3)
Phenanthrene (85-01-8)
Perylene (198-55-0)
Pyrene (129-00-0)

Dioxins/Furans (D/F) as 2,3,7,8-TCDD TEQs and CAS No.

1,2,3,4,6,7,8-Heptachlorodibenzofuran (67562-39-4)
1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin (35822-46-9)
1,2,3,4,7,8,9-Heptachlorodibenzofuran (55673-89-7)
1,2,3,4,7,8-Hexachlorodibenzofuran (70648-26-9)

[2] See Table 1 and Table 1-1 of EPA Methods TO-13A and 15A, respectively, for PAH and VOC analytes addressed by these methods. See https://www.epa.gov/amtic/compendium-methods-determination-toxic-organic-compounds-ambient-air (Also listed in this enclosure as **Appendix B**).

1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin (39227-28-6)
1,2,3,6,7,8-Hexachlorodibenzofuran (57117-44-9)
1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin (57653-85-7)
1,2,3,7,8,9-Hexachlorodibenzofuran (72918-21-9)
1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin (19408-74-3)
2,3,4,6,7,8-Hexachlorodibenzofuran (60851-34-5)
Octachlorodibenzo-p-Dioxin (3268-87-9)
1,2,3,7,8-Pentachlorodibenzofuran (57117-41-6)
1,2,3,7,8-Pentachlorodibenzo-p-Dioxin (40321-76-4)
2,3,4,7,8-Pentachlorodibenzofuran (57117-31-4)
2,3,7,8-Tetrachlorodibenzofuran (51207-31-9)
2,3,7,8-Tetrachlorodibenzo-p-Dioxin (1746-01-6)
Octachlorodibenzofuran (39001-02-0)

Speciated Volatile Organic HAP (VOHAP) from Stack Sampling[2]

1,3-butadiene (106-99-0)
Benzene (71-43-2)
Ethylbenzene* (100-41-4)
Formaldehyde (50-00-0)
Toluene (108-88-3)
Xylenes* (1330-20-7)
Benzene, ethylbenzene, toluene, xylenes (BTEX)

* Boiling point of this compound is above 120˚C

Emission/Process Units

The following is a list of the emission process units required to be tested at ByP and HNR coke oven facilities, as applicable.

HNR heat recovery steam generator (HRSG) main stacks
HNR bypass/waste heat stacks
ByP battery coke oven doors
Fenceline and interior facility fugitives (ByP and HNR)
Coke by-product recovery plants (CBRP): cooling towers, condenser vents, sulfur recovery units

Table 1-A shows the pollutants to be tested and is organized by each emissions point. Details of the testing are described in **Table 1-B**. All tests should be performed while the emission unit (and control device, where applicable) are operating under "typical" operating conditions. Typical operating conditions in the context of this testing request mean the usual, average, or most common operating conditions for the process unit for the past year. For example, if a coke oven unit has been operating in the extended coking mode for at least six months, is currently operating in extended coking, and there are no firm plans to convert this unit back to "normal coking" mode in the short-term in time to achieve steady-state by the time testing for this test request needs to be done, then "typical" operating conditions for this testing request is extended coking. Therefore, these units should test under the extended coking operating mode.

1.1 How to Select Sample Locations and Analysis Methods

The units selected for testing should be representative of current operation. All tests should be performed while the emission unit (and control device, where applicable) are operating under typical operating conditions.

If you would like to use a method not included here, please contact the EPA for approval of an alternative test method using the contacts listed in **Section 4.0**. The request for an alternative test method should include the alternative test method or prescriptive alternative procedure, the reason for the request (e.g., lower detection limit, site specific matrix interference, increased precision, etc.), supporting empirical data (e.g., comparison with specified method, precision determination, etc.), and quality control procedures which ensure results are sufficiently accurate and precise. See the Emission Measurement Center's ***Guideline Document 22*** (http://www.epa.gov/ttn/emc/guidlnd/gd22.pdf) for more information on what information should be included in an alternative test method request. For copies of the EPA test methods and additional information, please refer to the EPA's Emission Measurement Center website: http://www.epa.gov/ttn/emc/ . For methods identified as SW846 methods, see: http://www3.epa.gov/epawaste/hazard/testmethods/sw846/online/.

1.2 Required Source Testing and Process Information

Table 1-B below presents details of the required test methods, minimum number of test runs required, minimum test run duration, and units of measure. **Section 1.3** (**Table 2**) shows the process information required to be recorded during testing. **Section 1.4 (Tables 3 and 4**) describes the coke oven fuel gas tests and requested process, coke, and fuel gas information. **Section 1.5 (Table 5)** lists the stack and other emissions release point parameters needed for this test request. **Section 1.6** (**Table 6**) describes the procedures to be used to observe door leaks using EPA Method 303 from both the bench and the yard. **Section 1.7** (**Table 7**) discusses fugitive air emission testing procedures and methods for fenceline/interior monitoring for the selected facilities. **Section 1.8** discusses how to ensure data quality of the source tests performed. *Note:* If the EPA believes that a facility owner or tester has failed to meet the requirement of the CAA to provide data of the quality or quantity sufficient for our decisions, we likely will request additional measurements that will require the use of improved testing procedures.

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Table 1-A: Summary of Required Emission Testing for Coke Oven Plants - by Emission Process Unit

Emission Process Unit	Pollutant(s)/Parameters to Test[3]
Coke ByP Process Only	
Door Leaks, Bench and Yard	Visible emissions (leaks)
Coke ByP Recovery Plant (CBRP) Only	
Cooling Tower Inlet	BTEX, TO-15A analytes[2], H_2S, COS, CS_2
Light Oil Condenser (if venting to atmosphere)	BTEX, H_2S, COS, CS_2
Sulfur Recovery/Desulfurization	SO_2, H_2S, COS, CS_2
CBRP Flares Emergency Battery Flare	Visible emissions, gas composition (proximate/ultimate analysis), flow rate, and heat content
Heat and Non-Recovery Process (HNR) Only	
HNR Main Stack (after HRSG+CD)	Filterable PM & HAP metals, CO_2, CO, NO_x, formaldehyde, HCl, HF, HCN, PAH, D/F, opacity (stack), SO_2, BTEX
HNR Bypass Stacks HNR Waste Heat Stacks	Filterable PM & HAP metals, CO_2, CO, NO_x, formaldehyde, HCl, HF, HCN, PAHs, D/F, opacity (stack), SO_2, BTEX
Fugitive Emission Testing at Facility Fenceline//Interior Facility Grounds	
Fugitive emissions at the fenceline, and at interior facility locations near: (1) coke oven batteries and (2) CBRP	1,3 Butadiene, BTEX, PAHs, volatile organic compounds (VOC) (Table 1, EPA Method TO-13A[2] for PAHs and Table 1-1, EPA Method TO-15A[2] for VOC; see **Appendix B**)

[3] Tests are from air samples, unless otherwise noted.

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Table 1-B: Summary of Required Test Methods for Coke Oven Air Pollution Sources, by Pollutant

Pollutant or Parameter[4]	Emissions Process Unit	Required Methods[5]	Minimum (no.) of Test Runs[7] and Duration	Units of Measure
Filterable PM & HAP Metals HAP Metals: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury (Particulate and Vapor Phase), Nickel, Selenium (air)	HRSG Main stacks HNR Bypass/waste heat stacks	EPA Method 29[6]-Determine total filterable PM emissions according to §8.3.1.1 with a filter temperature of 248°F +/- 25°F. Alternatively, use Method 5 at this same temperature for total filterable PM. --Use inductively coupled (argon) plasma with mass spectrometry (IC (A) P/MS) for HAP metals in Method 29. Analyze front and back half samples separately. Report results for front half and back half analyses for individual metals separately. For mercury, report each individual fraction separately.	Perform at least seven (7) test runs.[7] Collect a minimum sample volume of 105 dscf (3 dscm) of gas for each test run.	mg/dscm mg/dscm @ 7% O_2 lb/hr
Sulfur Dioxide (SO_2)	HRSG Main stacks HNR Bypass/waste heat stacks CBRP Sulfur recovery/ desulfurization non-flare combustion units	EPA Method 6C, 6, or CEMS data, where applicable. *Note:* If permanently installed CEMS are used, the CEMS must be certified according to Performance Specification (PS) 2 and General Provisions Procedure 1 (40 CFR Part 60, Appendix F[8]) Temporary CEMS must meet the method criteria contained within Method 6C.	Perform at least three (3) test runs. Sample time should ensure that minimum quantification levels have been met under the methods used. Where permanently installed CEMs are used, the test run average is calculated as the average of the one-minute averages collected over the duration of the test run. The one-minute averages must be included in the test report.	ppmvd ppmvd @ 7% O_2 lb/hr

[4] See **Section 1.0** above for individual pollutants within each group of pollutants in this table.
[5] Most of the methods in this table can be found in in 40 CFR Part 60, Appendix A, unless otherwise noted. See https://www3.epa.gov/ttn/emc/promgate.html.
[6] Tester should monitor the color of the $KMnO_4$ impingers (hourly); if loss of color is observed in either impinger, recover the $KMnO_4$ impingers following the procedures found in Section 8.2.9 of EPA Method 29 and replace the impingers with fresh $KMnO_4$ absorbing solution.
[7] Unless otherwise indicated, the EPA is requesting seven (7) "successful" test runs, where successful is defined to be a test that meets all of the requirements of a valid test as per the EPA method or approved alternative method.
[8] See EPA's web site for a copy of the Performance Specifications (PS) and General Procedures at http://www3.epa.gov/ttn/emc/perfspec.html.

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Pollutant or Parameter[4]	Emissions Process Unit	Required Methods[5]	Minimum (no.) of Test Runs[7] and Duration	Units of Measure
Carbon Monoxide (CO)	HRSG Main Stacks HNR Bypass/waste heat stacks	EPA Method 10 or CEMS data, where applicable *Note:* If CEMS are used, the CEMS must be certified according to PS 4, 4A, or 4B and General Provisions Procedure 1 (40 CFR Part 60, Appendix F.[8])	Perform at least three (3) full runs. Where permanently installed CEMs are used, the test run average is calculated as the average of the one-minute averages collected over the duration of the test run. The one-minute averages must be included in the test report.	ppmvd ppmvd @ 7% O_2 lb/hr
Oxides of Nitrogen (NO_x)	HRSG Main Stacks HNR Bypass/waste heat stacks	EPA Method 7E or CEMS data, where applicable *Note:* If CEMS are used, the CEMS must be certified according to PS 2, and General Provisions Procedure 1 (40 CFR Part 60, Appendix F.[8]) OR EPA Method 320	Perform at least three (3) full runs. Where permanently installed CEMs are used, the test run average is calculated as the average of the one-minute averages collected over the duration of the test run. The one-minute averages must be included in the test report.	ppmvd ppmvd @ 7% O_2 lb/hr
Speciated Volatile Organic HAP (VOHAP), as Benzene, Ethyl Benzene, Toluene, Xylene (BTEX), speciated	HRSG Main stacks HNR Bypass/waste heat stacks CBRP Light Oil Condensers[9]	EPA Method 18 for BTEX **OR** Gas Chromatographic CEMS meeting the requirements of Performance Specification 9[10] with Relative Accuracy Test Audit performed using Method 18 (stack, only for BTEX)	Perform at least seven (7) test runs.[7] The in-stack detection limit (DL) using Method 18 must be no greater than 0.5 ppmvd.	As each individual compound: mg/dscm mg/dscm @ 7% O_2 (for HRSG Main and HNR Bypass/waste heat stacks) lb/hr
Formaldehyde	HRSG Main stacks HNR Bypass/waste heat stacks	EPA Method 320 for formaldehyde	Perform at least seven (7) test runs[7].	mg/dscm mg/dscm @ 7% O_2 lb/hr

[9] Only if the light oil condenser vents to the atmosphere. Document in the test report if the light oil condenser does not vent to atmosphere.
[10] Available at http://www3.epa.gov/ttn/emc/perfspec/ps-9.pdf.

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Pollutant or Parameter[4]	Emissions Process Unit	Required Methods[5]	Minimum (no.) of Test Runs[7] and Duration	Units of Measure
VOHAP and THC	CBRP Cooling Tower Inlets	Texas Commission on Environmental Quality (TCEQ) Appendix P and Texas Commission on Environmental Quality (TCEQ) Appendix P modified to incorporate a EPA Method TO-15A finish[11] for the VOC analyte list in Table 1-1 of EPA Method TO-15A (See Appendix B)	Perform at least seven (7) test runs of standard Appendix P, and three (3) test runs of the Appendix P with the TO-15A finish. Collect a minimum sample time of one (1) hour.	ppmvd
Hydrogen Sulfide (H_2S), Carbonyl Sulfide (COS), and Carbon Disulfide (CS_2)	CBRP Light oil condensers[9] CBRP Cooling tower inlets CBRP Sulfur recovery/desulfurization non-flare combustion units	EPA Method 15 For the cooling tower inlet, TCEQ Appendix P modified to incorporate a Method 15 finish (ppmvd only)	Perform at least seven (7) test runs except for the Cooling tower inlets. Perform at least three (3) test runs on the Cooling tower inlets	ppmvd ppmvd @ 7% O_2 (for combustion units and light oil condensers only) lb/hr (for combustion units and light oil condensers only)
Hydrogen Chloride (HCl) and Hydrogen Fluoride (HF)	HRSG Main stacks HNR Bypass/waste heat stacks	EPA Method 26A **OR** EPA Method 320[12]	Perform at least seven (7) test runs.[7] For tests with Method 26A, collect a minimum of 35 dscf (1 dscm) per run. Both the acidic and the basic impingers must be analyzed for fluoride.	mg/dcsm mg/dscm @ 7% O_2 lb/hr
Hydrogen Cyanide (HCN)	HRSG Main stacks HNR Bypass/waste heat stacks	EPA Method 320[12]	Perform at least seven (7) test runs [7]	mg/dscm mg/dscm @ 7% O_2 lb/hr

[11] "Air Stripping Method (Modified El Paso Method) for Determination of Volatile Organic Compound Emissions from Water Sources." Revision Number One, dated January 2003. Sampling Procedures Manual, Appendix P: Cooling Tower Monitoring. January 31, 2003. http://www.tceq.state.tx.us/assets/public/implementation/air/sip/sipdocs/2002-12-HGB/02046sipapp_ado.pdf

[12] The validation requirements in EPA Method 320 (sections 3.25, and 13.0 through 13.4) MUST be done but may not be practical for all facilities. Therefore, use of another method is advised when performance of the validation requirements is not practical.

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Pollutant or Parameter[4]	Emissions Process Unit	Required Methods[5]	Minimum (no.) of Test Runs[7] and Duration	Units of Measure
Semi-volatile Organic HAP Compounds (Semi-vol), including Polycyclic Aromatic Hydrocarbons (PAHs) and Dioxin/furans (see **Section 1.0** for individual analytes)	HRSG Main stacks HNR Bypass/waste heat stacks	Other Test Method 46 (OTM 46) for dioxins/furans and PAH	Perform at least seven (7) test runs. [7] Collect a minimum sample volume of 140 dscf (or 4 dscm) of gas, during each test run.[13]	micrograms per dscm (µg/dscm) µg/dscm @ 7% O_2 lb/hr For dioxin/furans: Report as individual congeners and as individual toxic equivalents (TEQ)
Opacity (stack)	HRSG Main stacks HNR Bypass/waste heat stacks	EPA Method 9 or COMS (including Procedure 3, Appendix F[14]); otherwise, as able to be used with preference for Method 9, as appropriate: LIDAR (Alternative Method 1 to Method 9 (40 CFR part 60, Appendix A-4), **OR** EPA ALT-082[15] (ASTM D7520-13, Digital Opacity Camera Method) *Note:* Use 6-minute averages for all sources.	Seven runs concurrent with PM/HAP metals tests. Report the maximum 6-minute average result for each run. Where any test run occurs at night or partial light, the recommended procedure is the Digital Opacity Camera Method, ALT-082. Alternatively, special procedures for Method 9 testing at night can be used if observer has been trained.	Percent (%)

[13] The minimum sample volume of 140 dscf (4 dscm) is required because of the following breakdown of the RDL for Benzo(a)pyrene in air samples assuming a detection limit of 15 ng (combined total of 3 fractions) and nominal flow rate of 10,000 scfm: 1 dscm sample: 5.59 x 10^{-7} lbs/hr; 2 dscm sample: 2.79 x 10^{-7} lbs/hr; 3 dscm sample: 1.87 x 10^{-7} lbs/hr; and 4 dscm sample: 1.40 x 10^{-7} lbs/hr.
[14] See http://www3.epa.gov/ttn/emc/perfspec/comspro3.pdf for Procedure 3 in Appendix F (40 CFR, part 60), which has been promulgated for COMS in the time period since subpart CCCCC was promulgated (2003).
[15] Available at: http://www3.epa.gov/ttn/emc/approalt.html

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Pollutant or Parameter[4]	Emissions Process Unit	Required Methods[5]	Minimum (no.) of Test Runs[7] and Duration	Units of Measure
Oxygen (O_2), Carbon Dioxide (CO_2)	HRSG Main stacks HNR Bypass/waste heat stacks Each tested unit in Enclosure 2, as needed for flowrate calculations	EPA Method 3A or 3B	Simultaneous with each pollutant test run to determine air flow rate and oxygen correction (all sources except CBRP -Cooling Tower Inlet).	Volume, %, dry CO_2 only: g/hr, lb/hr, or tons/hr
Moisture	Each tested unit in Enclosure 2, as needed for flowrate calculations	EPA Method 4	Simultaneous with each pollutant test run to determine air flow.	Volume, %
Visible Emissions	CBRP Flares Emergency battery flares[16]	EPA Method 22	Three runs, two hour duration For battery flares, test flares on two batteries	minutes
Flare Gas Composition and flow rate[17]	CBRP Flares Emergency battery flares[16]	Flow Rate EPA Method 1-2 Proximate/ultimate analysis ASTM D1945-14/D1946-90 Heat Content ASTM D4891-13 (2018)	Three runs, one-hour duration For battery flares, test flares on two batteries	Velocity – fpm Flow rate – acfm, dscfm Concentration - %, Heat content – BTU/scf

[16] Facilities may activate emergency flares (i.e., open battery vents to flares) for the purposes of these tests.
[17] Flare gas composition and flow rate measurement are only required when access ports on the flare line are available. When flare ports are not available, facility should document (in writing) with the emission report.

1.3 Process Information During Testing

Please monitor, record, and report the following process information listed in **Table 2** during all testing, during each test run.

Table 2. Process Information to Record/Monitor During Each Test

Process Data to Record, Monitor, and Report for Each Run
Emission unit(s) ID
Type of process (HRSG, HNR bypass/waste heat)
Type of air control device (e.g., baghouse, scrubber, ESP, other)
Latitude of stack (decimal degrees, 5 decimal places)
Longitude of stack (decimal degrees, 5 decimal places)
Date of test
Battery ID number/name
Type of coal charged during testing
Average coking time per oven(s) tested (hours)
Coke produced during test period (tons)

1.4 Coke Oven Fuel Gas Tests and Process, Coke Gas, and Fuel Gas Information

Along with testing at the HRSG, you must sample and analyze the coke oven gas as per the methods and tests in **Table 3**. Please provide the results of the mercury analyses and other fuel and process information shown in **Table 4**. The process information should be on an annual basis using the most recent normal production year (over 50 percent capacity utilization).

Table 3. Coke Oven Gas Analyses

Source	Analyte	Recommended Method	Sampling and Analysis	Units of Measure
Coke oven gas	Mercury	ASTM D5954-98 (2006), "Standard Test Method for Mercury Sampling and Measurement in Natural Gas by Atomic Absorption Spectroscopy."[18] *Note:* The detection limit of the procedure should be one (1) ng/m^3 or less.	Minimum of three (3) samples. At or directly before the guillotine isolation damper at HRSG inlet after connection to common tunnel or downstream of the HRSG.	g/m^3
	BTEX	GPA STD 2286 (2014): Method for the Extended Analysis of Natural Gas and Similar Gaseous Mixtures by Temperature Program Gas Chromatograph[19]		ug/dscm

[18] Available at http://www.astm.org/Standards/D5954.htm
[19] Available at https://gpamidstream.org/publications/item/?id=3835 or call (918) 493-3872. Price $55 US$.

Table 4. Process Fuel Gas Information[20]

Information Requested	Units
Rate of coke oven gas generated during tests	MMscf/hr
Rate of coke oven gas burned in coke battery	MMscf/hr
Quantity of coke oven gas burned in power plant	MMscf/year
Quantity of natural gas burned in coke battery	MMscf/year
Higher heating value of coke oven gas	Btu/scf
Higher heating value of natural gas	Btu/scf
Quantity of coke oven gas burned in power plant	MMscf/hr during tests
Quantity of coke oven gas burned in coke battery	MMscf/hr during tests
Quantity of natural gas burned in coke battery	MMscf/hr during tests
Quantity of coke oven gas generated (including gas recovered and used in ovens)	MMscf/hr during tests

1.5 Stack and Other Emissions Release Points

The information in **Table 5** shows the parameters required to be submitted as part of this test request for the stacks and other emission release sources (e.g., fugitives) during the source testing. Please fill out these tables as appropriate for all stacks and other emission release sources (fugitives) at the facility during the testing. Add rows as necessary for each stack or other emission release source.

Table 5. Stack and Unit Data

Information Requested	Description
Unit or Stack ID#	
Latitude/longitude (decimal degrees, 5 decimal places) Indicate if center of unit. For other locations(s), describe.	All stacks
	All coke batteries
	HRSG plants
	HNR bypass/waste heat stacks
	Other processes/plants on site (describe)
Stack Height	Feet
Stack Diameter	Inches, at discharge point
Stack Gas Temperature	°F
Stack Gas Velocity	Feet per second
Dimensions (LxWxH)	All coke batteries
	HRSG plant(s)
	Other processes/plants on site (describe)

[20] Based on the most recent production year with over 50 percent capacity utilization. *Note*: MMscf = millions of standard cubic feet; Btu/scf = British thermal units per standard cubic foot.

1.6 Door Leaks Bench-to-Yard Observation Comparison

Selected facilities must assess coke oven door leaks according to EPA Method 303 from both the yard and the bench. Two teams of two observers should be used. Each team should traverse the same side of the battery simultaneously, one team member at the bench and one at the yard. Team members should then switch position and re-traverse the battery to complete a set of observations. Please inform the EPA of any facility specific safety circumstances that may require modification to this methodology before beginning testing. The presence of any flames at each leak also should be noted in the report.

Four sets of observations (2 traverses, one for each team on 2 sides) should be performed at three different batteries. An example is shown in **Table 6** below for the first battery "XYZ". **Use a similar scheme for two more batteries for a total of three batteries tested for bench/yard data**. Abbreviations are as follows: O1 is Observer 1, O2 is Observer 2, etc.

Table 6. Example Door Leak Testing Sequence at Battery (XYZ)

Traverse No.	Battery XYZ – Coke Side		Battery XYZ – Coal Side	
	Bench	Yard	Bench	Yard
1A	O1, O2	O3, O4	O1, O2	O3, O4
1B	O3, O4	O1, O2	O3, O4	O1, O2
2A	O1, O3	O2, O4	O1, O3	O2, O4
2B	O2, O4	O1, O3	O2, O4	O1, O3
3A	O1, O2	O3, O4	O1, O2	O3, O4
3B	O3, O4	O1, O2	O3, O4	O1, O2
4A	O1, O3	O2, O4	O1, O3	O2, O4
4B	O2, O4	O1, O3	O2, O4	O1, O3

Note: Door leaks should be measured at a total of three batteries.

1.7 Fugitive Emission Testing Procedures and Methods for Fenceline/Interior Monitoring

Selected facilities are required to perform sampling and analysis according to the methods specified in **Table 7** to determine the facility fugitive emissions at fenceline and interior facility grounds, according to the procedures described below.

Use EPA Methods 325A/B to sample for benzene, toluene, ethylbenzene, xylenes, and 1,3 butadiene along the facility fenceline and interior facility grounds. The number and location of sampling sites is determined according to the specifications in section 8.2 of EPA Method 325A. You must perform thirteen 14-day long sampling episodes (24 hours per day) at each monitoring location, for a combined total of 182 days of sampling with EPA Method 325B.

In addition, selected facilities must sample fugitive emissions at the fenceline and interior facility grounds with Compendium Methods TO-13A and TO-15A for VOC and PAHs, respectively, according to the specifications listed in **Table 7** (below). When siting the TO monitors, you must consider the seasonal prevailing winds so that at least one monitor must be placed at an upwind sampling location. If there is potential for upwind off-site contribution, you may choose to select additional upwind sampling locations. [Note: TO-

13A and TO-15A sampling locations are not required to be collocated with an EPA Method 325A/B sampling location.] You must perform seven 24-hour long samples at each TO monitor location for a total of at least 21 samples (3x7) for TO-13A and at least 28 samples (4x7) of TO-15A.

For TO-15A, you must sample at a minimum of four monitoring locations at the fenceline including at least one upwind location, as discussed above. At least one monitor should be downwind of the batteries for both ByP and HNR. For ByP facilities, at least one of your fenceline sampling locations must be immediately downwind (based on seasonal prevailing winds) of the CBRP.

For TO-13A, at least three fenceline locations are required to be tested including at least one upwind location, as discussed above. At least one of the three fenceline sampling locations should be placed downwind from the batteries for both ByP and HNR. For ByP facilities, one monitor should be placed downwind from the tar processing at the CBRP.

In addition to the fenceline monitoring, you must sample fugitive emissions with TO-13A and 15A at one or two additional points within the interior facility grounds, depending on the type of facility, as follows: (1) one monitor at the centroid of the CBRP for ByP facilities, and (2) one monitor at the center of the area in space next to the coke batteries for both ByP and HNR facilities. You must perform seven 24-hour long samples at each location where you are required to sample for the TO methods, for a total of 7 or 14 samples (2x7) of TO-13A for HNR and ByP, respectively; and a total of 7 or 14 samples (2x7) of TO-15A for HNR and ByP, respectively, at the two interior facility locations (chemical plant for ByP and coke battery(ies) for both HNR and ByP).

Each 24-hour long sampling episode with the TO-13A and TO-15A methods must occur on an approximately bi-weekly basis and within the 2-week period of the EPA Method 325A/B sample. The summa canister inlets of the TO methods must be located within 1.5 to 3.0 meters above ground using a pole or other secure structure. The TO method canister sampling flowrate must be maintained nominally at a constant flowrate during the sample period.

Selected facilities must deploy a meteorological station (or use an existing available station[21]) consistent with the requirements in Section 8.3 of EPA Method 325A of Appendix A of 40 CFR part 63. You must report the meteorological data, including wind speed, wind direction, temperature, and barometric pressure on an hourly basis for each sampling episode.

[21] EPA Method 325A, section 8.1.4: Identify the closest available meteorological station. Identify potential locations for one or more on-site or near-site meteorological station(s) following the guidance in EPA-454/B-08-002 (Reference 11 to EPA Method 325A, incorporated by reference—see §63.14).

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40 CFR part 63, subpart CCCCC and subpart L

Table 7. Fugitive Emission Testing and Analysis: Fenceline/Interior

Recommended Method	Number Tests and Location	Duration of Tests	Timing	To Analyze	Units of Measure
EPA Methods 325A/B	Number and location as determined by Section 8.2 of EPA Method 325A for ByP and HNR	Thirteen 14-day long sampling episodes (24 hours per day), 182 days total testing each location		BTEX 1,3 Butadiene	ug/dscm ppbv
EPA TO-15A[2]	Four locations (minimum) ByP and HNR *Upwind:* One (minimum) upwind ByP and HNR *Two downwind*: Downwind of batteries: One for ByP, two for HNR Downwind of CBRP: One for ByP *One or two within interior grounds*: One near CBRP for ByP One in centroid space near batteries for both ByP and HNR	Seven 24-hour long samples, each location	Each 24-hour long sampling episode must occur on an approximately bi-weekly basis, within the 2-week period of the EPA Method 325B sampling	VOC analyte list in Table 1-1 of EPA Method TO-15A[2] (See Appendix B)	ug/dscm ppbv
EPA TO-13A[2]	Three locations (minimum): *Upwind:* One minimum both ByP and HNR *Two downwind*: Downwind of batteries: One for ByP, two for HNR Downwind of CBRP: One for ByP *One or two within interior grounds*: One near CBRP for ByP One in centroid space near batteries for both ByP and HNR	Seven 24-hour long samples, each location	Each 24-hour long sampling episode must occur on an approximately bi-weekly basis, within the 2-week period of the EPA Method 325A/B sampling	Analyte list in Table 1 of EPA Method TO-13A (See **Appendix B**) Note: Samples must be analyzed using GC/MS	ug/dscm ppbv

The selected facilities for fenceline/interior monitoring must submit a "Fenceline/Interior Monitoring Plan" to EPA that includes the planned sampling locations for approval prior to conducting any of the fugitive measurements. The "Fenceline/Interior Monitoring Plan" must depict the following: (1) The facility's significant emission sources of benzene, if known; (2) a description of each emission source containing enough information that EPA is able to properly review the emission sources; (3) each U.S. EPA Methods 325A/B sampling location(s); (4) each TO-13A and TO-15A sampling location(s); and (5) the location of the meteorological station. You also must develop a "Test Plan" that includes a simple facility schematic showing the coke batteries and major components of the CBRP, as applicable, that include, at minimum, the tar production and refining units, light oil production and refining units, cooling units, sulfur recovery/ desulfurization combustion unit, ammonium sulfate production units, napthalene processing units, waste units, and any other units included in the CBRP schematic required in **Enclosure 1**; and a "Quality Assurance Procedure Plan (QAPP)" that ensures the quality of the data being produced.

The "Fenceline/Interior Monitoring Plan," "Test Plan," and QAPP must be submitted to EPA within 45 days of receipt of the section 114 request. The EPA intends to conduct a quick review of those plans once received (primarily to ensure site locations are appropriate) and promptly provide approval and/or comments regarding the plans. Selected facilities must begin the fenceline/interior monitoring within 40 days of receipt of EPA's approval of the plans.

Selected facilities must report the fenceline/interior monitoring data to the Agency every 3-months for 6-months using the Excel® template provided in your information collection package. The schedule for submissions is summarized in Section 2.2.2. Rename the file in the format: Fugitive_Emission_Test_Results_[Company]_[Facility]_[Year]_[Quarter].xlsx and submit the results of the fugitive emission tests according to the instructions in Section 3. With this submission, you also should submit all meta data required to calculate the reported values. Direct your questions, if any, to the appropriate person listed in Section 4.0.

1.8 Ensuring Data Quality of the Source Tests Performed

While in most cases we are not specifying numerical minimum detection levels for the tests to be performed, we have specified the testing conditions and methods required, including test run sample volumes or times when appropriate, which we believe will provide data of a quality sufficient for decision making.

We remind facility owners and testers of the CAA section 114(a)(1) requirement to provide information requested for the development of emissions standards using methods that provide data necessary for the decisions. That includes data of quality sufficient to support those decisions. For the most part, we can identify test methods and procedures that will satisfy those decision making needs (e.g., minimum sampling times). In other cases, we recognize that the facility owner's or tester's selection of test procedures or equipment could bear significantly on the quality of the data.

We believe that the CAA is clear in that it is the responsibility of the source and the tester to apply methods and procedures that result in data quality necessary for our decisions, including providing for the lowest possible detection limits considering practical and reasonable limitations. For example, facility owners and testers should not automatically choose to use low or medium quality equipment for testing (e.g., for cost reasons) if high quality equipment is reasonably available. We will review test reports in light of this expectation and will be particularly mindful of whether the testing procedures applied are representative of the

highest reasonably expected capabilities (e.g., comparing reported minimum measurement detection levels between tests and testers). On completion of your required tests, please provide a complete test report, including appendices. A complete test report includes the following information, at a minimum:

- General identification information for the facility including a mailing address, the actual address, the owner or operator or responsible official (where they are applicable) or an appropriate representative and an email address for this person, and the appropriate Federal Registry System (FRS) number for the facility;
- A brief process description, including a flow diagram clearly showing the sampling site;
- A complete unit description, including control devices, the appropriate source classification code (SCC), the latitude and longitude of the emission process point being tested (to five decimal places), and the maximum permitted process rate (where applicable);
- Sampling site description;
- Description of sampling and analysis procedures and any modifications to standard procedures;
- Quality assurance procedures;
- Description of any deviations from the test methods or other anomalies that occurred with the process or control device operations during the test; Run-by-run emission data;
- Stack or exhaust gas flow rate (as determined using EPA Method 2, 2F, 2G, or 5D) at the time of and during the emissions test, as appropriate;
- Any process data and control device monitoring data required in this test request;
- Sample calculations of all applicable stack gas parameters, emission rates and analytical results, as applicable;
- Raw field data sheets and notes;
- Laboratory data and analysis reports;
- Chain-of-custody documentation;
- Explanation of laboratory data qualifiers;
- Quality assurance and quality control activities performed;
- Identification information for the company conducting the performance test including a contact person and his/her email address; and
- Any other information required by the test method.

If we believe that a facility owner or tester has failed to meet the requirement of the CAA to provide data of sufficient quality or quantity for our decisions, we will request additional measurements that require the use of improved testing procedures**.**

2.0 How to Report Data

The method for reporting the results of any testing and monitoring requests depend on the type of tests and methods used to complete the test requirements. This section discusses the requirements for reporting the data. Reporting data using the EPA's ERT Version 6 is discussed in **Section 2.1**. Reporting data for test methods not supported by the EPA's ERT is discussed in **Section 2.2.**

2.1 Reporting Stack Test Data within ERT

If you conducted a stack test using one of the methods listed in **Table 8**, shown below, you must report your data using the EPA's ERT Version 6. The ERT is a Microsoft® Access database application. If you are not a registered owner of Microsoft® Access, you can install the runtime version of the ERT Application. The ERT must be downloaded onto your computer prior to data entry. The ERT are available at http://www3.epa.gov/ttnchie1/ert/. The ERT supports an Excel® spreadsheet application (which can be downloaded at the same web address as the ERT) to document the collection of the field sampling data and easily upload into the ERT. After completing data entry in the ERT, you will also need to attach an electronic copy of the emission test report (PDF format preferred) to the Attachments module of the ERT. Both the ERT database and the emission test report should be transmitted to the EPA using one of the options described below in **Section 3**. **Enclosure 8** to this section 114 package provides an EPA ERT Version 6 example test plan and lists each field within the ERT and notes whether or not the field is required or optional. *Note*: The required reporting includes the latitude and longitude of each stack or emission process point tested (in decimal degrees to five (5) decimal places, which are the digits to the right of the decimal point).

Table 8: List of Applicable Coke Section 114 Source Test Methods Supported by EPA's Electronic Reporting Tool – ERT

Coke Section 114 Test Methods Supported by ERT
EPA Methods 1 through 4 (not 2F, 2G)
EPA Method 3A
EPA Method 5, 5B, 5F, 5G
EPA Method 6C
EPA Method 10
EPA Method 26A
EPA Method 29
Other Test Method 46

2.2 Reporting Other Test Data Not Listed in ERT

2.2.1 Air and Other Emission Tests and Door Leaks

You must report your test results for the following methods in copies of the spreadsheet answer files [*Coke-Enclosure-2-Emission Test Data Answer File*.xlsx and *Coke-Enclosure-2-Door-Leaks*.xlsx] provided in your coke section 114 package for methods **NOT** supported by ERT. Note each method has a separate worksheet:

Air and Other Tests NOT in ERT
EPA Method 2F, 2G
EPA Method 3B or CO_2 by facility CEMS
EPA Method 5D
EPA Method 6 or SO_2 by facility CEMS
EPA Method 9 or opacity by facility COMS
EPA Method 15
EPA Method 18 or gas chromatographic CEMS
EPA Method 303
EPA Method 320
EPA ALT-082 [ASTM D7520-13 (camera)]
CO by facility CEMS
ASTM D4891-13 (2018)
ASTM D5954-98 (2006)
GPA STD 2286 (2014)
TCEQ Appendix P

You must report the results of each test on the appropriately labeled worksheet that you develop using the spreadsheet that corresponds to the specific tests requested at your facility. If more than one source at your facility was tested using methods not currently supported by the ERT, you must save an electronic copy of each worksheet to report each test performed, making sure to update the source ID in order to distinguish between each separate source/test. After completing the worksheet, you must also submit an electronic copy of the emission test report (PDF format preferred). Both the *Coke Manufacturing Test Data Answer Excel File* with completed worksheets and the emission test report should be transmitted to the EPA using one of the options described below in **Section 3.**

2.2.2 Fugitive (Fenceline/Interior) Monitoring

Table 9 shows the schedule for fugitive emission testing. Once your fugitive test plan has been approved by EPA, you must report the fugitive emission sampling data, conducted with EPA Methods 325A/B and TO-13A&TO-15A, to the agency using the Excel® template provided in your information collection package. Rename the file in the format: *Fugitive_Emission_Test_Tesults_[Company]_[Facility]_[Year]_[Quarter].xlsx*

Table 9. Schedule for Fugitive Air Testing

Item	Date Due EPA	Approval by EPA
Fugitive monitoring plan	Within 45 days from receipt of EPA section 114 request	Within 14 days of receipt of all plans
Fugitive test plan		
Fugitive monitoring QAPP		
Begin fugitive monitoring	Within 40 days of receipt of EPA's approval of the plans.	
First 3 months of data	Within 140 days of the date EPA approves the monitoring plan	
Second 3 months of data	Within 230 days of the date EPA approves the monitoring plan	

Submit the results of the fugitive sampling data according to the submittal instructions in **Section 3**. With this submission, you should also submit all meta data required to calculate the reported values. Direct any questions to the appropriate person listed in **Section 4**. The fugitive air sampling test data report should be transmitted to the EPA using one of the options described in **Section 3**.

2.3 Guidance for Calculating and Reporting Measurements Less Than In-Stack Method Detection Levels for Emissions Data Submitted in Response to Section 114 Information Collection Request (ICR) Programs

Please identify the status of measured values relative to detection levels on the spreadsheet or in the ERT using the descriptions below. For each reported emissions value, insert the appropriate flag (BDL, DLL, or ADL) in the "**Note"** line of the Excel® emission test spreadsheet template or in the "**Flag"** column of the ERT.

- **BDL** (below detection level) – all analytical values used to calculate and report an in-stack emissions value are less than the laboratory's reported detection level(s);
- **DLL** (detection level limited) – at least one but not all values used to calculate and report an in-stack emissions value are less than the laboratory's reported detection level(s); or
- **ADL** (above detection level) – all analytical values used to calculate and report an in-stack emissions value are greater than the laboratory's reported detection level(s).

When reporting and calculating individual test run data:

- You must use the method specified approach for calculation and determination of the analytical detection limit for values that are below this limit (BDL). If the method does not specify the approach and calculation of BDL, determine the BDL as follows:
  - For air sampling and analysis methods, you must determine BDL in accordance with the procedures specified in Section 15 of Method 301.

- For analytical data reported from the laboratory as above BDL, include as ADL.

- For analytical data reported from the lab as "nondetect" or "below detection level"
  - Include a brief description of the procedures used to determine the analytical detection and in-stack detection level:
    - In the ***Note*** line of the emission test spreadsheet template provided by EPA; or
    - In the ***Comments*** line of Lab Data tab in the Run Data Details in the **ERT**.
  - Describe these procedures completely in a separate attachment or report section, and include the measurements made, the standards used, and the statistical procedures applied.
  - Calculate in-stack emissions rate for any analytical measurement below detection level using the relevant BDL, sampling volumes and other relevant run specific parameters (such as oxygen or flowrate). The reported value must assume that the analyte is present at the full BDL value.
  - Report the calculated emissions concentration or rate result:
    - As a bracketed "less than" detection level value (e.g., [<0.0105]) in the Excel® emission test spreadsheet template and include the appropriate flag in the ***Note*** line; or
    - As a numerical value in the **ERT** with the appropriate flag in the Flag column.

- Report as numerical values (i.e., no brackets or < symbol) any analytical data measured above the BDL, including any data between the BDL and a laboratory-specific reporting or quantification level (i.e., flag as ADL).
- Apply these reporting and calculation procedures to measurements made with **Method 23**:
  - Report data in the **ERT** for each of the D/F congeners measured with Method 23 below the detection level as [< detection level];
  - Do not report emissions of individual congeners as zero. The use of zero in Section 9.9 of EPA Method 23 is only for the determination of total dioxin/furan emissions in toxic equivalents.

- For pollutant measurements composed of multiple components or fractions (e.g., metals sampling train), when the result for the value for any component is measured below the BDL;
  - Calculate in-stack emissions rate or concentrations as outlined above for each component or fraction;
  - Sum the measured and/or calculated values (using the BDL as outlined above) for all of the components or fractions, and
  - Report the sum of all components or fractions:
    - As a bracketed "less than" detection level value (e.g., [<0.0105]) in the Excel® emission test spreadsheet template and include the appropriate flag in the Note line; or
    - As a numerical value in the ERT with the appropriate flag in the Comments line
    - If all components or fractions are BDL, the appropriate flag is BDL. If any component or fraction is ADL, the appropriate flag is DLL.

  - In addition to reporting the sum of the components or fractions, report the individual component or fraction values for each run if the Excel® emission test spreadsheet template or ERT format allows. If the Excel® emission test spreadsheet template or ERT format does not allow reporting of the individual components or fractions (i.e., the format allows reporting only a single sum value):
    - For the Excel® emission test spreadsheet template, next to the sum reported as above report in the Notes line the appropriate flag along with the values for the measured or detection level value for each component or fraction as used in the calculations (e.g., 0.036, [<0.069], 1.239, [<0.945] for a four fraction sample)
    - For the ERT, next to the sum reported as above, report in the Flag column the appropriate general flag and in the Comments column the measured or BDL value for each component or fraction as used in the calculations (e.g., 0.036, [<0.069], 1.239, [<0.945] for a four fraction sample).

- For measurements conducted using instrumental test methods (e.g., Methods 3A, 6C, 10):
  - Record gaseous concentration values as measured including negative values and flag as ADL; do not report as BDL
  - Calculate and report in-stack emissions rates using these measured values
  - Include relevant information relative to calibration gas values or other technical qualifiers for measured values in ***Comments*** line in the **ERT.**

- When reporting and calculating average emissions rate or concentration for a test when some results are reported as BDL:
  - Sum all of the test run values including those indicated as BDL or DLL as numerical values

- Calculate the average emissions rate or concentration (e.g., divide the sum by 3 for a three-run test series)
- Report the average emissions rate or concentration average:
  - As a bracketed "less than" detection level value (e.g., [<20.06]) in the Excel® emission test spreadsheet template and include the appropriate flag in the ***Note*** line
  - As a numerical value in the **ERT** and include the appropriate flag in the Comments line.
  - If all test run values are BDL, the appropriate flag is BDL. If any test run value is ADL or DLL, the appropriate flag is DLL.

3.0 How to Submit Data

3.1 Non-confidential Data

You should submit your **non-confidential** data (including the responses to the Questionnaire, , new test reports, ERT database, Excel® spreadsheets (non-ERT methods and fenceline/interior monitoring), and associated information, etc.) in one of the ways listed below. Please refer to **Enclosure 4** to aid you in determining what information can be claimed confidential. In order to avoid duplicate data and keep all data for a particular facility together, we request that you submit all of the data requested from any one facility in the same way, if possible. To submit your data, you may choose any ONE of the procedures below:

(1) *Preferred* – Email an electronic copy of all non-confidential requested files to **Coke.ICR2@rti.org** (please try to keep file sizes sent over email smaller than 10 MB). If assistance is needed with submitting large electronic files that exceed the file size limit for email attachments, please email **Coke.ICR2@rti.org** to request a file transfer link. or

(2) *Alternative* – Mail a CD, DVD, or flash drive/USB containing an electronic copy of all non-confidential requested files to either of the two EPA address below (hard copies are permitted if that's the only possibility; otherwise, **electronic is preferred**).

Please use the address below for U.S. postal service for **non-confidential** mail if using the alternative method of delivery:

Dr. Donna Lee Jones (Mail Code D243-02) **NONCONFIDENTIAL**
Metals and Inorganic Chemicals Group
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Please use the address below for commercial package carriers, such as FedEx or UPS, for **non-confidential** mail if using the alternative method of delivery:

Dr. Donna Lee Jones (Mail Code D243-02) **NONCONFIDENTIAL**
Metals and Inorganic Chemicals Group
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
4930 Old Page Road
Durham, NC 27709

3.2 Submitting Confidential Data

Our preferred method to receive confidential business information (CBI) is for it to be transmitted to the Office of Air Quality Planning and Standards (OAQPS) electronically using email and attachments, File Transfer Protocol, or the online file sharing services (e.g., Dropbox, OneDrive, Google Drive). Electronic submissions must be transmitted directly to the OAQPS CBI Office using the email address, oaqpscbi@epa.gov , and should include clear CBI markings. If assistance is needed with submitting large electronic files that exceed the file size limit for email attachments, and if you do not have your own file sharing service, please email oaqpscbi@epa.gov to request a file transfer link.

4.0 Contact Information for All Questions Including Testing and Reporting

Please send all written questions and/or comments by **EMAIL** to Dr. Donna Lee Jones at Jones.DonnaLee@epa.gov or by **EMAIL** to Chuck French at French.Chuck@epagov . You may also send a hard copy duplicate if you wish. Make sure you give these complete instructions to any **contractors or testing companies** that you employ to assist you with the testing. Contractors and testing companies may also contact Dr. Jones directly if you so choose. **For questions specific to testing and reporting**, please also include in the email: Kevin McGinn at Mcginn.Kevin@epa.gov, and Ned Shappley at Shappley.Ned@epa.gov.

Appendix A
Abbreviations & Acronyms

Acronym	Parameter
acf	actual cubic feet
acfm	actual cubic feet per minute
acm	actual cubic meters
ADL	above detection level
APC	air pollution control
ASTM	American Society for Testing and Materials
atm	atmosphere
BDL	below detection level
Btu/hr	British thermal units per hour
Btu/scf	British thermal units per standard cubic foot
CAA	Clean Air Act
CBI	confidential business information
CBRP	coke by-product recovery plant
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
COG	coke oven gas
COMS	continuous opacity monitoring system
Cr	chromium
CTM	conditional test method
day/yr	days per year
°C	degrees Celsius
°F	degrees Fahrenheit
D/F	dioxins and furans
DLL	detection level limited
dscf	dry standard cubic feet
dscfm	dry standard cubic feet per minute
dscm	dry standard cubic meters
dscmm	dry standard cubic meters per minute
EPA	U.S. Environmental Protection Agency
ERT	electronic reporting tool
ESP	electrostatic precipitator
Ft	foot or feet
ft^2	square feet
ft^3	cubic feet
fpm	feet per minute (acfm divided by ft2 of filter area)
fps	feet per second
gal	gallon
gpm	gallons per minute (U.S.)
gr	grain
gr/dscf	grains per dry standard cubic foot
g	gram

Acronym	Parameter
HAP	hazardous air pollutants
HCl	hydrogen chloride
H_2S	hydrogen sulfide
Hg	mercury
HRSG	heat recovery steam generator
HNR	heat and non-recovery process
hr	hour or hours
hr/day	hours per day
ICR	information collection request
in.	inch or inches
in. H_2O	inches of water (pressure drop)
kg	kilogram
kPa	kilopascals
kv	kilovolt
kw-hr	kilowatt hour
lb	pound
lb/day	pounds per day
lb/gas	pounds per U.S. gallon
lb/hr	pounds per hour
lb/ton	pounds per ton
m	meter
m^3	cubic meters
MACT	maximum achievable control technology
MDL	method detection level
min	minute or minutes
Mg	Megagram
mg	Milligram
mg/kg	milligram per kilogram
mg/l	milligrams per liter
MM btu/hr	millions of British thermal units per hour
MM scf	millions of standard cubic feet
MMlb/yr	million pounds per year
$\mu g/m^3$	microgram per cubic meter
µm	micrometer
NAICS	North American Industry Classification System
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_x	nitrogen oxides
OAQPS	Office of Air Quality Planning and Standards
OTM	Other Test Method
PAH	polynuclear aromatic hydrocarbon
PM	particulate matter
$PM_{2.5}$	particulate matter that is 2.5 micrometers or less in diameter
ppmv	parts per million by volume
ppmw	parts per million by weight
PS	performance specification
RATA	relative accuracy test audit

Acronym	Parameter
%	percent
s	second or seconds
scf	standard cubic feet
scf/hr	standard cubic feet per hour
scfm	standard cubic feet per minute
scm	standard cubic meters
scmm	standard cubic meters per minute
SO_2	sulfur dioxide
SPPD	Sector Policies and Programs Division
TCEQ	Texas Commission on Environmental Quality
THC	total hydrocarbons
TO	toxic organics
tpd	tons (short) per day (U.S.)
tph	tons (short) per hour (U.S.)
tpy	tons (short) per year (U.S.)
TDS	total dissolved solids
TSO	toluene-soluble organics (EPA Method 315)
TSP	total suspended particulate
VOHAP	volatile organic HAP
vol%	volume percent, or percent by volume
wt%	weight percent, or percent by weight
yr	year

To Convert From:	To:	Multiply by:
°C	°F	multiply by 1.8, then add 32
°F	°C	subtract 32, then multiply by 0.556
ft	m	0.3048
ft/min	m/min	0.3048
ft^2	m^2	0.0929
ft^3	m^3	0.028
g	lb	0.0022
g/m^3	lb/ft^3	0.0000624
gr	lb	0.000143
gr/dscf	mg/dscm	2,290
in water	mm water	25.4
kg/hr	lb/hr	2.205
lb	g	454
lb	gr	7000
lb/ft^3	g/m^3	16,000
lb/hr	kg/hr	0.454
m	ft	3.28
m/min	ft/min	3.28
mm water	in water	0.0394
m^2	ft^2	10.76
mg/dscm	gr/dscf	0.00044
m^3	ft^3	35.31
Mg	ton	1.1
ton (short)	Mg	0.907

List of Hazardous Air Pollutants (HAP)

CAS Number	Chemical Name
	Antimony Compounds
	Arsenic Compounds (inorganic including arsine)
	Beryllium Compounds
	Cadmium Compounds
	Chromium Compounds
	Cobalt Compounds
	Coke Oven Emissions
	Cyanide Compounds[1]
	Glycol ethers[2]
	Lead Compounds
	Manganese Compounds
	Mercury Compounds
	Fine mineral fibers[3]
	Nickel Compounds
	Polycyclic Organic Matter[4]
	Radionuclides (including radon)[5]
	Selenium Compounds
75070	Acetaldehyde
60355	Acetamide
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene
107028	Acrolein
79061	Acrylamide
79107	Acrylic acid
107131	Acrylonitrile
107051	Allyl chloride
92671	4-Aminobiphenyl
62533	Aniline
90040	o-Anisidine
1332214	Asbestos
71432	Benzene (including benzene from gasoline)
92875	Benzidine
98077	Benzotrichloride
100447	Benzyl chloride
92524	Biphenyl
117817	Bis(2-ethylhexyl)phthalate (DEHP)
542881	Bis(chloromethyl)ether
75252	Bromoform
106945	1-bromopropane
106990	1,3-Butadiene

CAS Number	Chemical Name
156627	Calcium cyanamide
133062	Captan
63252	Carbaryl
75150	Carbon disulfide
56235	Carbon tetrachloride
463581	Carbonyl sulfide
120809	Catechol
133904	Chloramben
57749	Chlordane
7782505	Chlorine
79118	Chloroacetic acid
532274	2-Chloroacetophenone
108907	Chlorobenzene
510156	Chlorobenzilate
67663	Chloroform
107302	Chloromethyl methyl ether
126998	Chloroprene
1319773	Cresols/Cresylic acid (isomers and mixture)
95487	o-Cresol
108394	m-Cresol
106445	p-Cresol
98828	Cumene
94757	2,4-D, salts and esters
3547044	DDE
334883	Diazomethane
132649	Dibenzofurans
96128	1,2-Dibromo-3-chloropropane
84742	Dibutylphthalate
106467	1,4-Dichlorobenzene(p)
91941	3,3-Dichlorobenzidene
111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542756	1,3-Dichloropropene
62737	Dichlorvos
111422	Diethanolamine
121697	N,N-Diethyl aniline (N,N-Dimethylaniline)
64675	Diethyl sulfate
119904	3,3-Dimethoxybenzidine
60117	Dimethyl aminoazobenzene
119937	3,3'-Dimethyl benzidine
79447	Dimethyl carbamoyl chloride
68122	Dimethyl formamide
57147	1,1-Dimethyl hydrazine
131113	Dimethyl phthalate

CAS Number	Chemical Name
77781	Dimethyl sulfate
534521	4,6-Dinitro-o-cresol, and salts
51285	2,4-Dinitrophenol
121142	2,4-Dinitrotoluene
123911	1,4-Dioxane (1,4-Diethyleneoxide)
122667	1,2-Diphenylhydrazine
106898	Epichlorohydrin (l-Chloro-2,3-epoxypropane)
106887	1,2-Epoxybutane
140885	Ethyl acrylate
100414	Ethyl benzene
51796	Ethyl carbamate (Urethane)
75003	Ethyl chloride (Chloroethane)
106934	Ethylene dibromide (Dibromoethane)
107062	Ethylene dichloride (1,2-Dichloroethane)
107211	Ethylene glycol
151564	Ethylene imine (Aziridine)
75218	Ethylene oxide
96457	Ethylene thiourea
75343	Ethylidene dichloride (1,1-Dichloroethane)
50000	Formaldehyde
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diisocyanate
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid
74908	Hydrogen cyanide
7664393	Hydrogen fluoride (Hydrofluoric acid)
123319	Hydroquinone
78591	Isophorone
58899	Lindane (all isomers)
108316	Maleic anhydride
67561	Methanol
72435	Methoxychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)

CAS Number	Chemical Name
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	4,4-Methylene bis(2-chloroaniline)
75092	Methylene chloride (Dichloromethane)
101688	Methylene diphenyl diisocyanate (MDI)
101779	4,4'¬-Methylenedianiline
91203	Naphthalene
98953	Nitrobenzene
92933	4-Nitrobiphenyl
100027	4-Nitrophenol
79469	2-Nitropropane
684935	N-Nitroso-N-methylurea
62759	N-Nitrosodimethylamine
59892	N-Nitrosomorpholine
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Aroclors)
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
78875	Propylene dichloride (1,2-Dichloropropane)
75569	Propylene oxide
75558	1,2-Propylenimine (2-Methyl aziridine)
91225	Quinoline
106514	Quinone
100425	Styrene
96093	Styrene oxide
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79345	1,1,2,2-Tetrachloroethane
127184	Tetrachloroethylene (Perchloroethylene)
7550450	Titanium tetrachloride
108883	Toluene
95807	2,4-Toluene diamine

CAS Number	Chemical Name
584849	2,4-Toluene diisocyanate
95534	o-Toluidine
8001352	Toxaphene (chlorinated camphene)
120821	1,2,4-Trichlorobenzene
79005	1,1,2-Trichloroethane
79016	Trichloroethylene
95954	2,4,5-Trichlorophenol
88062	2,4,6-Trichlorophenol
121448	Triethylamine
1582098	Trifluralin
540841	2,2,4-Trimethylpentane
108054	Vinyl acetate
593602	Vinyl bromide
75014	Vinyl chloride
75354	Vinylidene chloride (1,1-Dichloroethylene)
1330207	Xylenes (isomers and mixture)
95476	o-Xylenes
108383	m-Xylenes
106423	p-Xylenes

Note: For all listings above which contain the word "compounds" and for glycol ethers, the following applies: “Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.”

Footnotes:
1: X'CN where X = H' or any other group where a formal dissociation may occur. For example KCN or Ca(CN)2. *Note*: Hydrogen cyanide has its own CAS No.
2: Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n - OR' where:

n = 1, 2, or 3
R = alkyl or aryl groups
R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH2CH)n-OH. Polymers are excluded from the glycol category. Also excludes ethylene glycol monobutyl ether (EGBE) (2-Butoxyethanol) (Chemical Abstract Service (CAS) No. 111-76-2) and surfactant alcohol ethoxylates and their derivatives (SAED).

3: Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
4: Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100º C.
5: A type of atom which spontaneously undergoes radioactive decay.

Appendix B
Table 1 from TO-13A[2] and Table 1-1 from TO-15[2]

EPA/625/R-96/010b

Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air

Second Edition

Compendium Method TO-13A

Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Ambient Air Using Gas Chromatography/Mass Spectrometry (GC/MS)

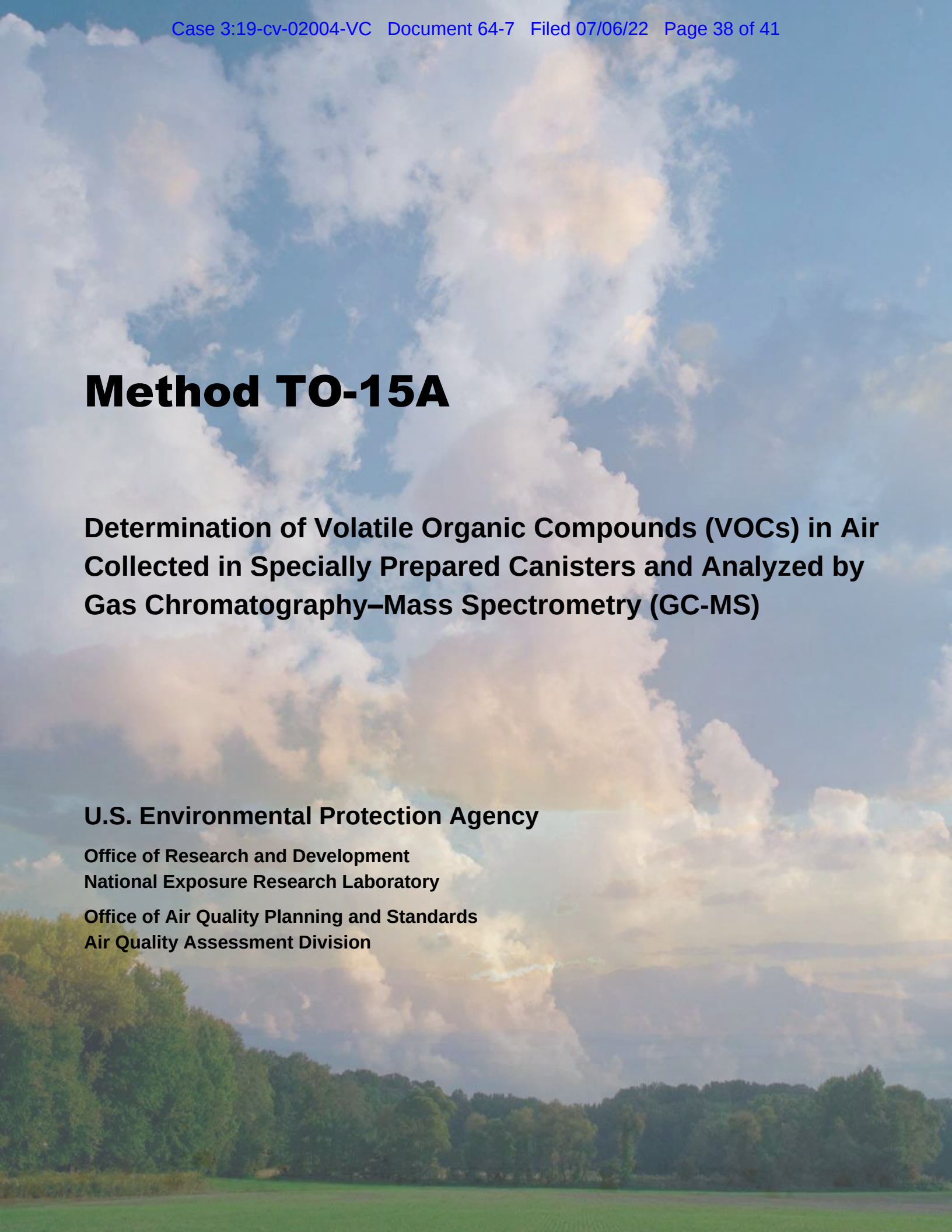
Center for Environmental Research Information
Office of Research and Development
U.S. Environmental Protection Agency
Cincinnati, OH 45268

January 1999

TABLE 1. FORMULAE AND PHYSICAL PROPERTIES OF SELECTED PAHs

Compound	Formula	Molecular Weight	Melting Point, °C	Boiling Point, °C	Vapor Pressure, kPa	CAS RN #
Naphthalene	$C_{10}H_8$	128.18	80,2	218	1.1x10	91-20-3
Acenaphthylene	$C_{12}H_8$	152.20	92-93	265-280	3.9x10	208-96-8
Acenaphthene	$C_{12}H_{10}$	154.20	90-96	278-279	2.1x10	83-32-9
Fluorene	$C_{13}H_{10}$	166.23	116-118	293-295	8.7x10	86-73-7
Anthracene	$C_{14}H_{10}$	178.24	216-219	340	36x10	120-12-7
Phenanthrene	$C_{14}H_{10}$	178.24	96-101	339-340	2.3x10	85-01-8
Fluoranthene	$C_{16}H_{10}$	202.26	107-111	375-393	6.5x10	206-44-0
Pyrene	$C_{16}H_{10}$	202.26	150-156	360-404	3.1x10	129-00-0
Benz(a)anthracene	$C_{18}H_{12}$	228.30	157-167	435	1.5x10	56-55-3
Chrysene	$C_{18}H_{12}$	228.30	252-256	441-448	5.7x10	218-01-9
Benzo(b)fluoranthene	$C_{20}H_{12}$	252.32	167-168	481	6.7x10	205-99-2
Benzo(k)fluoranthene	$C_{20}H_{12}$	252.32	198-217	480-471	2.1x10	207-08-9
Perylene	$C_{20}H_{12}$	252.32	273-278	500-503	7.0x10	198-55-8
Benzo(a)pyrene	$C_{20}H_{12}$	252.32	177-179	493-496	7.3x10	50-32-8
Benzo(e)pyrene	$C_{20}H_{12}$	252.32	178-179	493	7.4x10	192-92-2
Benzo(g,h,i)perylene	$C_{22}H_{12}$	276.34	275-278	525	1.3x10	191-24-2
Indeno(1,2,3-cd)pyrene	$C_{22}H_{12}$	276.34	162-163	--	ca.10	193-39-5
Dibenz(a,h)anthracene	$C_{22}H_{14}$	278.35	266-270	524	1.3x10	53-70-3
Coronene	$C_{24}H_{12}$	300.36	438-440	525	2.0x10	191-07-1

Many of these compounds sublime.



Method TO-15A

Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography–Mass Spectrometry (GC-MS)

U.S. Environmental Protection Agency

Office of Research and Development
National Exposure Research Laboratory

Office of Air Quality Planning and Standards
Air Quality Assessment Division

1 Scope

Table 1-1: Volatile Organic Compounds Quantifiable with EPA Method TO-15A

VOC (Alternative Name)[a]	Empirical Formula	CAS[b] Number	Boiling Point (°C)	Vapor Pressure at 20 °C (mm Hg)[c]	Molecular Weight (g/mol)	Typical Ions Monitored
Propene (propylene)	C_3H_6	115-07-1	-48.0	***8686***	42.1	41/39
Dichlorodifluoromethane (Freon 12)	CCl_2F_2	75-71-8	-29.8	4260	120.9	85/87
Chloromethane (methyl chloride)	CH_3Cl	74-87-3	-23.7	3672	50.5	50/52
Chloroethene (vinyl chloride)	C_2H_3Cl	75-01-4	-13.8	2505	62.5	62/64
1,3-Butadiene (butadiene)	C_4H_6	106-99-0	-4.0	1838	54.1	39/54
1,2-Dichlorotetrafluoroethane (Freon 114)	$C_2Cl_2F_4$	76-14-2	4.1	1444	170.9	85/135
Bromomethane (methyl bromide)	CH_3Br	74-83-9	3.5	1420	94.9	94/96
Ethylene oxide	C_2H_4O	75-21-8	10.6	1095	44.1	29/44/15
Chloroethane (ethyl chloride)	C_2H_5Cl	75-00-3	12.5	1000	64.5	64/66
Trichlorofluoromethane (Freon 11)	$CFCl_3$	75-69-4	23.7	690	137.4	101/103
1,1-Dichloroethene (vinylidene chloride)	$C_2H_2Cl_2$	75-35-4	31.7	500	96.9	61/96

VOC (Alternative Name)[a]	Empirical Formula	CAS[b] Number	Boiling Point (°C)	Vapor Pressure at 20 °C (mm Hg)[c]	Molecular Weight (g/mol)	Typical Ions Monitored
Dichloromethane (methylene chloride)	CH_2Cl_2	75-09-2	39.8	350	84.9	49/84
Carbon disulfide (methanedithione)	CS_2	75-15-0	46.0	297	76.1	76/44
1,1,2-Trichlorotrifluoroethane (Freon 113)	$C_2Cl_3F_3$	76-13-1	47.7	285	187.4	101/151
2-Propenal (acrolein)	C_3H_4O	107-02-8	52.3	217	56.1	56/55
2-Methoxy-2-methylpropane (methyl *tert*-butyl ether, MTBE)	$C_5H_{12}O$	1634-04-4	55.2	203	88.2	73/41
2-Chloro-1,3-butadiene (chloroprene)	C_4H_5Cl	126-99-8	59.4	188	88.5	88/53
1,1-Dichloroethane (ethylidene chloride)	$C_2H_4Cl_2$	75-34-3	57.4	182	99.0	63/65
cis-1,2-Dichloroethene (*cis*-1,2-dichloroethylene)	$C_2H_2Cl_2$	156-59-2	55.0	180–265	96.9	61/96
trans-1,2-Dichloroethene (*trans*-1,2-dichloroethylene)	$C_2H_2Cl_2$	156-60-5	48.7	180–265	96.9	61/96
2-Propanone (acetone)	C_3H_6O	67-64-1	56.1	180	58.1	43/58
Trichloromethane (chloroform)	$CHCl_3$	67-66-3	61.2	160	119.4	83/85
Tetrahydrofuran (oxolane)	C_4H_8O	109-99-9	66.0	132	72.1	42/41
Hexane	C_6H_{14}	110-54-3	68.7	120	86.2	57/43
Isopropyl ether (diisopropyl ether)	$C_6H_{14}O$	108-20-3	69.0	119	102.2	45/43
1,1,1-Trichloroethane (methyl chloroform)	$C_2H_3Cl_3$	71-55-6	74.0	100	133.4	97/99
2-Ethoxy-2-methylpropane (ethyl *tert*-butyl ether, ETBE)	$C_6H_{14}O$	637-92-3	72.6	96	102.2	59/87
Methanol (methyl alcohol)	CH_4O	67-56-1	64.7	92	32.0	31/29
Carbon tetrachloride (tetrachloromethane)	CCl_4	56-23-5	76.5	91	153.8	117/119
Ethenyl acetate (vinyl acetate)	$C_4H_6O_2$	108-05-4	72.7	83	86.1	43/86
2-Propenenitrile (acrylonitrile)	C_3H_3N	107-13-1	77.3	83	53.1	53/52
2-Butanone (methyl ethyl ketone, MEK)	C_4H_8O	78-93-3	79.6	78	72.1	43/72
Cyclohexane	C_6H_{12}	110-82-7	80.7	78	84.2	56/84
Benzene	C_6H_6	71-43-2	80.1	76	78.1	78/77
Acetonitrile (cyanomethane)	C_2H_3N	75-05-8	81.6	73	41.1	41/40
Ethyl acetate	$C_4H_8O_2$	141-78-6	77.1	73	88.1	43/61
2-Methoxy-2-methylbutane (*tert*-amyl methyl ether)	$C_6H_{14}O$	994-05-8	86.3	68	102.2	73/43
1,2-Dichloroethane (ethylene dichloride)	$C_2H_4Cl_2$	107-06-2	83.5	64	99.0	62/64
1,1,2-Trichloroethene (trichloroethylene)	C_2HCl_3	79-01-6	87.2	58	131.4	130/132
Bromodichloromethane	$CHBrCl_2$	75-27-4	90.0	50	163.8	83/85
Ethanol (ethyl alcohol)	C_2H_6O	64-17-5	78.3	44	46.1	31/45
1,2-Dichloropropane (propylene dichloride)	$C_3H_6Cl_2$	78-87-5	96.0	42	113.0	63/62
Heptane	C_7H_{16}	142-82-5	98.4	35	100.2	43/41
2-Propanol (isopropanol)	C_3H_8O	67-63-0	82.3	33	60.1	45/43
2-Methyl-2-propanol (*tert*-butyl alcohol, TBA)	$C_4H_{10}O$	75-65-0	82.3	31	74.1	59/31
1,4-Dioxane (*p*-dioxane)	$C_4H_8O_2$	123-91-1	101.2	29	88.1	88/58
Methyl methacrylate (methyl 2-methylprop-2-enoate)	$C_5H_8O_2$	80-62-6	100.5	29	100.1	41/69
trans-1,3-Dichloropropene (*trans*-1,3-dichloropropylene)	$C_3H_4Cl_2$	10061-02-6	108.0	28	111.0	75/39
cis-1,3-Dichloropropene (*cis*-1,3-dichloropropylene)	$C_3H_4Cl_2$	10061-01-5	104.3	26	111.0	75/39
Toluene (methylbenzene)	C_7H_8	108-88-3	110.6	21	92.1	91/92
1,1,2-Trichloroethane	$C_2H_3Cl_3$	79-00-5	114.0	19	133.4	97/83

VOC (Alternative Name)[a]	Empirical Formula	CAS[b] Number	Boiling Point (°C)	Vapor Pressure at 20 °C (mm Hg)[c]	Molecular Weight (g/mol)	Typical Ions Monitored
4-Methyl-2-pentanone (methyl isobutyl ketone, MIBK)	$C_6H_{12}O$	108-10-1	116.5	16	100.2	43/58
1,1,1,2-Tetrachloroethane	$C_2H_2Cl_4$	630-20-6	130.5	***14***	167.8	133/131
Tetrachloroethene (perchloroethylene)	C_2Cl_4	127-18-4	121.3	14	165.8	166/164
1,2-Dibromoethane (ethylene dibromide)	$C_2H_4Br_2$	106-93-4	131.0	11	187.9	107/109
Chlorobenzene	C_6H_5Cl	108-90-7	131.6	9	112.6	112/77
m-Xylene (1,3-xylene)	C_8H_{10}	108-38-3	139.1	9	106.2	91/106
p-Xylene (1,4-xylene)	C_8H_{10}	106-42-3	138.3	9	106.2	91/106
Isopropylbenzene (cumene)	C_9H_{12}	98-82-8	152.4	8	120.2	105/120
Ethylbenzene	C_8H_{10}	100-41-4	136.2	7	106.2	91/106
o-Xylene (1,2-xylene)	C_8H_{10}	95-47-6	144.5	7	106.2	91/106
Dibromochloromethane (chlorodibromomethane)	$CHBr_2Cl$	124-48-1	122.0	***6***	208.3	129/127
Styrene (vinylbenzene)	C_8H_8	100-42-5	145.3	5	104.2	104/103
1,1,2,2-Tetrachloroethane (tetrachloroethane)	$C_2H_2Cl_4$	79-34-5	146.0	5	167.9	83/85
Tribromomethane (bromoform)	$CHBr_3$	75-25-2	149.5	5	252.8	173/171
2-Chlorotoluene (1-chloro-2-methylbenzene)	C_7H_7Cl	95-49-8	159.2	3	126.6	91/126
4-Ethyltoluene (1-ethyl-4-methylbenzene)	C_9H_{12}	622-96-8	162.0	***3***[d]	120.2	105/120
n-Propylbenzene	C_9H_{12}	103-65-1	159.2	***3***	120.2	91/120
sec-Butylbenzene (2-phenylbutane)	$C_{10}H_{14}$	135-98-8	173.5	***2***	134.2	105/134
tert-Butylbenzene	$C_{10}H_{14}$	98-06-6	169.1	***2***	134.2	119/91
m-Dichlorobenzene (1,3-dichlorobenzene)	$C_6H_4Cl_2$	541-73-1	173.0	***2***	147.0	146/148
Hexachlorobutadiene (hexachloro-1,3-butadiene)	C_4Cl_6	87-68-3	215.0	2	260.8	225/227
2-Hexanone (methyl butyl ketone, MBK)	$C_6H_{12}O$	591-78-6	127.2	2	100.2	43/58
2-Isopropyltoluene (*o*-cymene)	$C_{10}H_{14}$	527-84-4	178.0	***2***	134.2	119/134
1,2,4-Trimethylbenzene (pseudocumene)	C_9H_{12}	95-63-6	169.0	***2***	120.2	105/120
1,3,5-Trimethylbenzene (mesitylene)	C_9H_{12}	108-67-8	165.0	2	120.2	105/120
n-Butylbenzene	$C_{10}H_{14}$	104-51-8	183.3	***1***	134.2	91/92
Chloromethylbenzene (benzyl chloride)	C_7H_7Cl	100-44-7	179.0	1	126.6	91/92
o-Dichlorobenzene (1,2-dichlorobenzene)	$C_6H_4Cl_2$	95-50-1	180.1	1	147.0	146/148
p-Dichlorobenzene (1,4-dichlorobenzene)	$C_6H_4Cl_2$	106-46-7	174.0	1	147.0	146/148
1,2,4-Trichlorobenzene	$C_6H_3Cl_3$	120-82-1	213.0	1	181.4	180/182
Naphthalene (naphthene)	$C_{10}H_8$	91-20-3	218.0	***0.1***	128.2	128/127

[a]Compound information is derived from PubChem (https://pubchem.ncbi.nlm.nih.gov/), an open chemistry database from the National Institutes of Health, U.S. National Library of Medicine, National Center for Biotechnology Information.

[b]Chemical Abstracts Service.

[c]Vapor pressures shown in bold italics are values at 25 °C.

[d]ThermoFisher Scientific, 4-Ethyltoluene Safety Data Sheet, Revised January 26, 2018.